

Remarks

Claims 1 - 19 are pending. Favorable reconsideration is respectfully requested.

The present invention is directed to aqueous polymer dispersions useful as low emissions tile adhesives, and water redispersible powders prepared therefrom. The polymer particles are copolymers prepared from ethylene; a vinyl ester whose homopolymer has a $T_g > 0$, e.g. vinyl acetate; a branched vinyl ester of 8 - 13 carbon atoms whose homopolymer has a $T_g < 0$; and an unsaturated mono- or dicarboxylic acid. The copolymers are free of alkyl acrylates, and have a T_g in the range of -60°C to -10°C .

Tile adhesives cannot be satisfactorily prepared from vinyl acetate and ethylene alone, as these copolymers do not possess the required tack. In the past, therefore, alkylacrylates such as n-butylacrylate or 2-ethylhexylacrylate were copolymerized. However, the alkyl ester side groups contained in the copolymer are subject to hydrolysis, thus liberating the corresponding alkanol, i.e. n-butanol or 2-ethylhexanol, respectively, over time. Such alkanol emissions are toxicologically undesirable.

Thus, the object of the invention was to prepare copolymers which exhibit the excellent tack and other physical properties of EVA/alkylacrylate copolymers without generating alkanol emissions. Applicants achieved this objective through incorporation of monomers from four distinct monomer classes: ethylene, vinyl esters whose copolymer $T_g > 0$, preferably vinyl acetate; branched C_{8-13} vinyl esters whose copolymer $T_g < 0$, preferably VeoVa®10 and/or VeoVa®11; and a small amount of an unsaturated mono- or dicarboxylic acid, preferably acrylic acid or methacrylic acid.

Applicants wish to express their appreciation to Examiner Aftergut for telephoning Applicants' attorney to inform him that translations of the two Japanese prior art documents would be provided. These have been received. A review of their disclosures augments Applicants' arguments relative to the patentability of the claims over the cited

references. However, prior to discussion of the references and their teachings, a discussion of the combinability of references under 35 U.S.C. § 103 is believed warranted.

It is well established that unlike rejections for anticipation under 35 U.S.C. § 102, rejections under 35 U.S.C. § 103 may be based on a combination of references. However, references may not be combined indiscriminately. First, the references must be analogous references within the mandates of *In re Clay* 23 U.S.P.Q. 1058 (Fed. Cir. 1992) and its progeny. Only then may references be considered with respect to combinability.

Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); *In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979).

If the references sought to be combined are analogous references, then second there must be some teaching or suggestion to combine the references. *ACS Hospital Systems, Inc. v. Montefiore Hospital* 221 U.S.P.Q. 929 (Fed. Cir. 1984).

However, even if the references are analogous, and even if there is motivation to combine, the proposed combination still must meet several criteria which are well established in the law. For example, one cannot "pick and choose" isolated features from a reference while ignoring the reference's remaining features or teachings. *In re Wesslau* 147 U.S.P.Q. 391 (CCPA 1965); *Ex parte Kuhn*, 132 U.S.P.Q. 359 (POBA 1961). It is also well established that references cannot be combined when one or more references teaches away from the invention, or teaches away from the remaining prior art references with which it is sought to be combined. See, e.g. *In re Grasselli*, 218 U.S.P.Q. 769 (Fed. Cir. 1983).

Grasselli is discussed in the MPEP at § 2145(2) (p. 2100-157; Feb 2003, Rev. 1), and is particularly apt. In *Grasselli*, a multi-component, iron-containing phospho-molybdate catalyst was at issue. Claim 6 had been rejected over the combination of *Hiroki* in view of *Sennewald*. *Hiroki* disclosed all the catalyst components with the exception of iron, and further disclosed alkalizing the catalyst employing, *inter alia*, antimony.

Sennewald disclosed similar phospho-molybdate catalysts for the same utility, which, however, included iron, the component missing from *Hiroki*, and was cited by the Office for the limited purpose (secondary reference) of supplying this missing ingredient. However, while *Sennewald* disclosed addition of iron, he also recited that the catalyst should be free of antimony.

In reversing the Board, the Federal Circuit indicated that *Hiroki* and *Sennewald* could not be combined, even for the limited purpose of the teaching of iron as a catalyst component, since *Hiroki* taught optional inclusion of antimony while *Sennewald* specifically negated its use.

These safeguards discussed above and others have been promulgated by the Courts to aid in a proper determination of the obviousness requirement of 35 U.S.C. § 103, i.e. whether the proposed combination would suggest itself to one of ordinary skill in the art so as to place the invention in the hands of the public. Applicants earnestly submit that the references applied to the present instance do not meet the tests for combination so as to support a *prima facie* case of obviousness within the remaining of 35 U.S.C. § 103. In particular, one of the references, JP-A-4-145182 (“*JP ‘182*”) is not an analogous reference, and moreover teaches away from the claimed invention; and JP 47-3705 (“*JP ‘705*”) and EP 295 727 (“*EP ‘727*”) cannot be combined, as their respective teachings are diametrically opposed, and the references are directed to a fundamentally different subject matter. A discussion of each reference follows.

1. JP '705:

*JP '705*¹ is directed to coating compositions (paints) which are aqueous emulsions (sic: dispersions) of copolymers of ethylene, vinyl acetate, and a vinyl ester of a tertiary aliphatic carboxylic acid, i.e. "latex paints." In *JP '705*, the problem to be solved was the preparation of latex paints exhibiting superior water resistance, elasticity, and flexibility over paints employing ethylene/vinyl acetate ("EVA") copolymers. This problem was solved by copolymerizing vinyl esters of tertiary carboxylic acids (Formula, page 3), where the total carbons represented by R¹, R², and R³ are from 3 to 11. Thus, the smallest tertiary carboxylic acid is trimethylacetate (C₅), used in Example 9 (Table, p. 13). Another tertiary carboxylic acid vinyl ester employed in the same table is vinyl-2,2-dimethylvalerate (Example 7).

A concern to the *JP '705* inventors was a potential increase in surface adhesion (tack) in the polymer film (page 4, lines 8 - 12) and loss of adhesion to the substrate (page 4, lines 12 - 13). The *JP '705* inventors indicate that amounts of vinyl tertiary carboxylates below 5% by weight increase tack, while amounts greater than 30% decrease substrate adhesion. It should be noted in this respect that the subject invention seeks to improve tack over EVA copolymers, while at the same time avoiding the use of alkylacrylates which had been used for this purpose.²

The coatings of *JP '705* are clearly intended, and would be viewed as such by the skilled artisan, as having a relatively high Tg. The reason is, of course, that paints, when

¹ The page numbers of both JP references as cited herein refer to page numbers of the English translations.

² Thus, *JP '705* teaches that if vinyl tertiary carboxylates of any kind are used, if tack is to be increased, they should be used in amounts of less than 5% by weight. The subject claims require minimally 5% by weight, and preferably 10 - 45% by weight (claims 10, 12). *JP '705* thus directs the skilled artisan away from the invention, even when the nature (Tg) of the vinyl tertiary carboxylate is ignored. *JP '705* also teaches against increasing tack.

dry, should not be “sticky”, otherwise dust and soil will adhere. Example 1 of *JP '705* (Table 1, page 7) employs 30 pbw ethylene, 55 pbw vinyl acetate, and 15 pbw vinylneodecanoate.³ It should be noted that the “tack” of this copolymer (first column, last row of continuation of the table, page 8) is listed as hardly noticeable (“seldom recognized”). The Tg of this copolymer is not given, nor is there any teaching of copolymers having a Tg between -60°C and -10°C.

According to *JP '705*, addition of tertiary carboxylic acid vinyl esters can lower the tack if used in amounts of 5 weight percent or more. This appears to be supported by the *JP '705* examples, where the Example 1 copolymer (15% VeoVa 10) had no noticeable tack, considerably less than a straight, high vinyl acetate content EVA copolymer (Comparative Example 4) and comparable to a polyvinyl acetate homopolymer (Comparative Example 1).

JP '705 also does not distinguish from among the possible vinyl tertiary carboxylates; all are treated the same. In fact, two examples employ vinyl tertiary carboxylates whose homopolymers have $T_g > 0$: vinyl pivalate (vinyl trimethylacetate), homopolymer Tg 86°C; and vinyl-2,2-dimethylvaccerate, homopolymer Tg 10°C.

Thus, summarizing the teachings of *JP '705* as they would appear to one skilled in the art:

- 1) use of vinyl tertiary carboxylates of any kind in amounts greater than 5% lowers tack of the copolymer produced;

³ The Applicants confirm that vinyl neodecanoate is identical or substantially identical to VeoVa 10.

⁴ No unsaturated mono- or dicarboxylic acid comonomer is employed, nor is the use of such taught or suggested.

- 2) low tack (and hence high Tg) is desired, as the *JP* '705 copolymers are for coating (paint) applications;
- 3) preparation of copolymers having a Tg in the range of -60°C to -10°C is not taught or suggested, rather the clear implication is that higher Tg and thus low tack are desired;
- 4) use of unsaturated mono- or dicarboxylic acid comonomers for any purpose is neither disclosed nor suggested;
- 5) there is no reason to select any vinyl ester having a Tg < 0 - Tg of the vinyl ester is of no importance;
- 6) no use of the copolymers as adhesives, particularly tile adhesives, is taught or suggested;
- 7) the problem solved is increasing water resistance, flexibility, and elasticity of coated films. There is no discussion of the problem solved by Applicants.

2. *JP* '182

JP '182 is not directed to aqueous copolymer tile adhesive dispersions, nor to redispersible powder suitable therefor, but rather is directed to solvent-borne tile adhesives. These solvent-borne adhesives contain dissolved polymers, and are in no way similar to the aqueous dispersions or powders of the present invention. Applicants submit, therefore, that *JP* '182 is not an analogous reference⁵.

The problem addressed by *JP* '182 is provide solvent-borne tile adhesives which can perform like prior art adhesives which were asbestos-laden vinyl acetate ethylene

⁵ As noted in *Clay*, paraphrasing, merely because both the subject invention and *JP* '182 are directed to tile adhesives does not render them analogous. The general field of tile adhesives (*Clay*: petroleum storage) is broad, and solvent borne adhesives are very different from latex adhesives. The copolymers employed have very different requirements. Moreover, as discussed later, the problems solved by *JP* '182 is different from the problem solved by Applicants as well. Neither *Clay* criteria is met.

copolymers, vinyl acetate-VeoVa copolymers,⁶ or vinyl acetate/VeoVa/acrylate copolymers. Due to environmental concerns with asbestos, asbestos was required to be removed from the compositions. However, the asbestos-free compositions were not suitable as solvent-borne tile adhesives. *JP '182* solved this problem in asbestos-free compositions by employing two-component combinations of three distinct copolymers, as set forth below.

	Vinyl acetate/VeoVa Copolymer	Vinyl acetate/VeoVa/ Acrylate Copolymer	Vinyl acetate/ethylene Copolymer
Combination 1	present	absent	present
Combination 2	absent	present	present

Thus, in the adhesive solution, two distinct copolymers must be present, one of these always being an EVA copolymer, and the other being either a vinyl acetate/VeoVa copolymer, or a vinyl acetate/VeoVa/acrylate copolymer. It should be noted that the latter contains alkylacrylate residues, which the present invention specifically excludes. *JP '182* does not disclose any copolymer containing any unsaturated mono- or dicarboxylic acid.

Thus, one skilled in the art would view *JP '182* as teaching:

- 1) solvent-borne tile adhesives, not aqueous dispersions or redispersible powders;
- 2) tile adhesives require two distinct polymers;
- 3) use of alkyl acrylates is acceptable in copolymers;
- 4) copolymers of ethylene, vinyl ester with homopolymer $T_g > 0$, and vinyl ester with $T_g < 0$ are not disclosed;

⁶ "Veoba" [sic: VeoVa] is not defined. It could be any tertiary carboxylic acid ester product, *JP '182* is therefore also non-enabling. A non-enabling reference cannot be used in formulated a rejection. *In re LeGrice*, 133 USPQ 365,372 (CCPA 1962); *In re Collins*, 174 U.S.P.Q. 333 (CCPA 1972).

- 5) use of unsaturated mono- or dicarboxylic acids is not disclosed nor suggested;
- 6) the specification is non-enabling, as "Veova"⁷ is nowhere defined.

3. EP '727

EP '727 is directed to aqueous lattices ("latexes" = polymer dispersions) for coatings (paints) which improve upon the properties of prior art dispersions employing copolymers of ethylene, vinyl acetate, and vinyl chloride, and copolymers of ethylene and vinyl acetate. The lattices of *EP '727* are prepared by copolymerizing ethylene, vinyl acetate, and a C₉ tertiary carboxylic acid vinyl ester whose homopolymer has a Tg in the range of 20°C to 120°C (page 2, lines 46 - 50). The copolymers are prepared with the aid of 0.2 to 3% (based on polymer weight) of an internal stabilizer of copolymerized acrylic acid, an unsaturated monocarboxylic acid.

EP '727 specifically refers to *JP '705*, which is also directed to coating systems, and which has been previously discussed. *EP '727* indicates that even though *JP '705* indicates that use of Veova10 does not increase tack (see prior discussion of '705), the copolymers of '705 are still too tacky, despite no increase in tack, and tend to degrade in the presence of alkali. (Page 2, lines 32 - 37). Therefore, the *EP '727* inventors specifically direct against use of Veova10, and employ Veova9 instead, a vinyl ester with a Tg > 0, and in the range of 20 - 120°C (actually about 60°C).

In Table 1, eleven copolymers are described, all stabilized with 0.5% by weight of acrylic acid. As can be seen from the table, all the copolymer Tgs are relatively high, the lowest being -7°C, while most are in the range of 10 - 12°C. All the copolymers are ethylene/vinyl acetate/ Veova9 copolymers. In Table 2, comparative copolymers are prepared

⁷ "Veoba" in the translation

employing VeoVa10, as taught by *JP* '705. Once again, all Tgs are relatively high, ranging from 0°C to 16°C, with most being greater than 4°C.

Thus, one skilled in the art would find that *EP* '727 teaches the following:

- 1) VeoVa10 is to be avoided. Rather, a C₉ tertiary carboxylic ester having a Tg in the range of 20 - 120°C is to be employed;
- 2) if stabilization of the polymer is required, surfactants, colloidal stabilizers, or copolymerized acrylamide or acrylic acid may be employed - preferably combinations of surfactants and internal, copolymerized stabilizer;
- 3) the copolymer dispersions are aqueous lattices.

Claims 1 - 8 and 11 - 18 have been rejected under 35 U.S.C. § 103(a) over *JP* '705 in view of *EP* '727. Applicants respectfully traverse this rejection.

First, these references are not properly combinable under 35 U.S.C. § 103. *JP* '705 teaches coating compositions prepared from ethylene, vinyl acetate, and any vinyl tertiary carboxylate. Examples employ VeoVa10, while other examples employ other carboxylates. *EP* '727 is cited as a secondary reference, for addition of acrylic acid as a stabilizer (Applicants' component d): unsaturated mono- or dicarboxylic acid). However, *EP* '727 specifically and distinctly directs against the use of vinyl carboxylates other than C₉ tertiary carboxylic acid vinyl esters having a homopolymer Tg in the range of 20°C to 120°C. VeoVa10 has a homopolymer Tg of -3°C, far outside this limit.

Thus, the situation here between *JP* '705 and *EP* '727 is exactly the same as that forbidden by the Federal Circuit in *Grasselli*. *EP* '727, like *Sennewald* in *Grasselli*, teaches away from using VeoVa10. Therefore, following the rationale of *Grasselli*, these references

cannot be combined, even for the limited purpose of supplying Applicants' missing component d). Withdrawal of the rejection of the claims over *JP '705* in view of *EP '727* is therefore solicited.

Second, there is no motivation to combine the references. There must be some teaching, suggestion, or incentive supporting the proposed combination. *ACS Hospital, Supra*. See also, *Ex parte Metcalf*, 67 U.S.P.Q. 2d 1633 (BPAI 2003) (unpublished). Here, the Office suggests that "one skilled in the art would have expected that some type of stabilizer would have been expected to have been used . . . and upon a complete translation it is expected that the reference would have hinted at or suggested the same." However, *JP '705* in fact does not suggest that a copolymerized acrylic acid or acrylamide stabilizer be used. To the contrary, *JP '705* employs no such stabilizer⁸, nor does it teach or suggest the same. Rather, *JP '705* employs conventional surfactants in the preparation of his copolymers: sodium dodecylbenzene sulfonate and polyoxyethylene nonylphenyl ether. Since the dispersions of *JP '705* are in no need of a copolymerized "internal" stabilizer, there is no suggestion to combine. Moreover, since *EP '727* teaches that only C₉ vinyl carboxylates having a Tg between 20°C and 120°C be used, and *JP '705* includes all vinyl carboxylates, *EP '727* would motivate against combination.

Third, even were the combination proper, the combination would teach use of ethylene/vinyl acetate/VeoVa9 copolymers. While *JP '705* allows use of any vinyl carboxylate irrespective of its homopolymer Tg, *EP '727* clearly and distinctly states that only C₉ tertiary carboxylates having a Tg of 20°C to 120°C can be used. This is a premier, salient teaching of *EP '727* which cannot be disregarded. One cannot "pick and choose" only the acrylic acid copolymerized stabilizer from *EP '727* while ignoring the remainder of the teachings of the reference. To do so would violate the mandate of *In re Wesslau, supra*.

⁸ The unsaturated mono- and dicarboxylic acids of Applicants' component d) are not employed as "stabilizers." Stabilizers used are conventional surfactants. See pages 7 - 8 of Applicants' specification.

Finally, neither of the references disclose, teach, or suggest the claim limitation that the copolymer have a Tg in the range of -60°C to -10°C. Neither reference even mentions any Tg range for the copolymer, and as both references are directed to coatings rather than tile adhesives, there would be no motivation in view of these references, to prepare polymers with very low Tg⁹.

For all the foregoing reasons, withdrawal of the rejection of the claims over *JP '705* in view of *EP '727* is solicited.

Claims 1 - 19 have been rejected under 35 U.S.C. § 103(a) in view of *JP '705* and *EP '727*, further in view of *JP '182*. Applicants respectfully traverse this rejection also.

JP '705 and *EP '727* are not combinable under the standards set by *Grasselli*, as discussed previously. *JP '182* is also not properly combinable with either *JP '705* or *EP '727*. *JP '182* is directed to solvent-borne tile adhesives, while both *JP '705* and *EP '727* are directed to aqueous dispersions (no solvent) for coatings. The properties of tile adhesives are far different from coatings. Solvent-borne polymer solutions are far different from aqueous dispersions.

With respect to both the *JP '705* and *EP '727* references and to the subject invention, *JP '182* is not an analogous reference within the standards set by *In re Clay*. First, the fields of endeavor (tile adhesive versus coating; polymer solution versus aqueous dispersion) are different. Second, the problems solved (tile adhesives which work without asbestos versus coatings with improved water resistance, flexibility) are different. Non-analogous references may not be combined.

⁹ It should be noted that the claimed range of Tg of -60°C to -10°C is a separate and distinct limitation from the compositional weights of the various monomers. Merely because a composition is within the compositional range does not mean that the Tg is in the range. Tg can be calculated prior to polymer preparation by the Fox equation, as indicated in the specification.

Second, there is no motivation to combine these references. One skilled in the art of polymer dispersion tile adhesives, seeking improved performance without use of acrylates would not look to any of these references. *JP* '705 and *EP* '727 are directed to coatings, not to tile adhesives. *JP* '182 is directed to tile adhesives, but of a very different type: solvent-borne adhesives.¹⁰ Moreover, *JP* '182 teaches that single copolymers such as those of *JP* '705 and *EP* '727 are not useful: rather, polymer mixtures must be employed. It should be noted that none of the polymers of *JP* '182 correspond to any of either the subject invention or *JP* '705 or *EP* '727. While both *JP* '705 and *EP* '727 employ ethylene/vinyl acetate/vinyl carboxylate copolymers, *JP* '182 employs vinyl acetate/ethylene copolymers, vinyl acetate/vinyl carboxylate copolymers, and ethylene/vinyl carboxylate/acrylate copolymers.¹¹ As the copolymers employed are very different, and as *JP* '182 teaches against using a single copolymer, Applicants fail to find any motivation to combine.

If combined, what would the references suggest to one skilled in the art? First, it would suggest that acrylates could be used as monomers, since one of the copolymers of *JP* '182 includes acrylates, and *EP* '727 allows up to 10% of "other" copolymerizable monomers.

Second, the combination would suggest that a single co(ter)polymer, as is the subject of *JP* '705, *EP* '727, and the subject invention, cannot be used as a tile adhesive, but rather mixtures of different polymers, none of which correspond to those of the subject invention, should be used.

Third, the combination would suggest that should a tile adhesive composition be desired, then solvent-borne tile adhesives and not aqueous polymer dispersions should be used.

¹⁰ Note that the preferred solvents of *JP* '182 are lower alcohols, exactly the type of emissions the present invention avoids.

¹¹ The latter are the type Applicants expressly teach against using, as the acrylate ester residues hydrolyze to produce alkanol emissions.

In all honesty, the completely disparate teachings of the references cannot be reconciled. Only by picking and choosing isolated portions of the three references, while at the same time ignoring their salient teachings, could the compositions of Applicants be derived. This kind of picking and choosing, however, is not allowed. *In re Wesslau, supra*. One skilled in the art could not have derived the subject invention with these three references before him or her. Withdrawal of the rejection over *JP '705*, *EP '727*, and *JP '182* is solicited.

Claim 19 has been rejected over *JP '705*, *EP '727*, and *JP '182* in view of "Applicants' admitted prior art." As previously discussed, the three prior art references are not combinable. Applicants are also unaware of any "admission" which can be combined with the three prior art references to render the subject invention obvious. It is true that tile adhesives have been employed on cementitious, alkaline surfaces. However, none of the prior art suggests that elimination of acrylates as copolymerizable monomers will avoid alkanol emissions. As a matter of fact, *JP '182* clearly teaches the combination of an ethylene/vinyl carboxylate/acrylate copolymer with an EVA copolymer. The former will produce alkanol emissions when employed on an alkaline substrate. Neither of the other references teaches or suggests avoiding acrylates. Acrylates are common ingredients in polymer dispersions, and previously have been necessary ingredients in tile adhesives based on aqueous polymer dispersions. *EP '727* specifically "allows" other comonomers. *JP '705* discloses no use of monomers other than ethylene, vinyl acetate, and vinyl tertiary carboxylates. However, *JP '705* is not directed to tile adhesives (nor is *EP '727*) where cementitious substrates are to be at least sometimes expected. The polymers improved upon by *JP '705* are EVA polymers, not EVA/acrylate polymers. Thus *JP '705* fails to direct the skilled artisan to the claimed invention. Withdrawal of the rejection of claim 19 is solicited.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, he is highly encouraged to telephone Applicants' attorney at the number given below.

Respectfully submitted,

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